STIMULATING THE BRAIN WITH MICROSCOPIC MAGNETS

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Imagine if your biggest health problem could be solved with the flip of a switch. Deep-brain stimulation (DBS) offers such a dramatic recovery for a range of neurological illnesses, including Parkinson's disease, epilepsy and major depression. Yet the metal electrodes implanted in the brain are too bulky to tap into intricate neural circuitry with precision and corrode in contact with tissue, so their performance degrades over time. Now neurophysiologists have developed a method of DBS that avoids these problems by using microscopic magnets to stimulate neurons.

In contrast to the electric currents induced by DBS, which excite neurons in all directions, magnetic fields follow organized pathways from pole to pole, like the magnetic field that surrounds the earth. The researchers found that they could direct the stimulus precisely to individual neurons, and even to particular areas of a neuron, by orienting the magnetic coil appropriately.

The micromagnets also solve other problems associated with metal electrodes. The magnetic field easily penetrates the magnets' plastic coating, which prevents corrosion and the ensuing inflammation of brain tissue.

Although the study focused on stimulating neurons, micromagnets could be used to activate other excitable tissues, such as in the heart, inner ear or muscles in our extremities, as part of a pacemaker or prosthetic device.

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